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**[Authors Final Submitted Copy]****Title:**

The Chinese version of the 8-item Committed Action Questionnaire (ChCAQ-8): A preliminary analysis of the factorial and criterion validity

**Authors:**

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**Abstract**

Committed action is a key component of the psychological flexibility model that recently has been applied in chronic pain settings. Developed within the Western context, the 8-item Committed Action Questionnaire (CAQ-8) demonstrated good psychometric properties. This study aimed to translate the original English version of the CAQ-8 into Chinese (ChCAQ-8) and to assess its reliability, factor structure and concurrent criterion validity. A total of 210 Chinese patients with chronic pain completed the ChCAQ-8, the Chronic Pain Grade (CPG), the Pain Catastrophizing Scale (PCS), and the depression subscale of the Hospital Anxiety and Depression Scale (HADS-Dep). Results of confirmatory factor analysis showed both the two-factor correlated (CFI = .99) and hierarchical (CFI = .98) models met the minimum acceptable fit criterion. The two subscales and the entire scale of ChCAQ-8 demonstrated good internal consistency (Cronbach's  $\alpha$ s ranging .70 - .86). The ChCAQ-8 negative subscale score showed significant positive relationship with pain intensity, disability, pain catastrophizing, and depression. The ChCAQ-8 positive subscale was significantly correlated with pain

castastrophizing and depression. Results of multivariate regression modeling showed the ChCAQ-8 negative subscale predicted depression (std  $\beta = .19$ ,  $p < .01$ ) and disability (std  $\beta = .14$ ,  $p < .05$ ), after adjusting for pain intensity, pain duration and pain catastrophizing. Our findings offer preliminary evidence for the reliability, factorial and concurrent criterion validity of the ChCAQ-8 in the Chinese population.

(word count: 229)

**Keywords:** Committed action; psychological flexibility; Chinese; confirmatory factor analysis.

## Introduction

Behavioral coping responses are pivotal in chronic pain self-management. In addition to avoidance behaviors, long recognized as predictors of chronic pain and disability (Fordyce, 1976; Vlaeyen & Crombez, 1999), maladaptive/passive coping behaviours such as guarding and resting are associated with higher pain intensity and poorer functioning (Jensen, Keefe, Lefebvre, Romano, & Turner, 2003; Romano, Jensen, & Turner, 2003; Tan, Jensen, Robinson-Whelen, Thornby, & Monga, 2001; Truchon & Cote, 2005; Wong, Jensen, Mak, Tam, & Fielding, 2010). Conversely, adaptive/active coping behaviours such as task persistence and staying busy are associated with more physical activity and better psychological functioning (Truchon & Cote, 2005; Wong et al., 2010). Individuals employing cognitive coping strategies, like perceived control over pain and rational thinking, reported lower pain intensity, disability, and psychological distress (Tan, Jensen, Robinson-Whelen, Thornby, & Monga, 2002; Tota-Faucette, Gil, Williams, Keefe, & Goil, 1993). These data offer evidence for activity patterns being a core factor in the negative cycle of chronic pain.

Despite this body of research, equivocal findings regarding the nature of associations of certain activity patterns with chronic pain adjustment have been reported. Studies that evaluated multidisciplinary pain treatment programs based on cognitive-behavioral models demonstrated weak association between changes in pain coping strategies and changes in treatment outcomes (Jensen, Turner, & Romano, 2001; Vowles & McCracken, 2010). Specifically, in contrast to previous data on the beneficial effects of task persistence on chronic pain outcomes, research has shown that patients evidencing task persistence coping and “overuse” activity patterns reported greater pain intensity and poorer functioning (Bousema, Verbunt, Seelen, Vlaeyen, & Knottnerus, 2007; Hasenbring, Hallner, & Rusu, 2009a, 2009b; Hasenbring, Plaas, Fischbein, & Willburger, 2006). At the same time increased task persistence has been associated with positive mood, instead of negative mood (de Gier, Peters, & Vlaeyen,

2003; Van Houdenhove & Neerinx, 1999). These anomalous findings cannot easily be explained by the cognitive-behavioral model of chronic pain. A deeper and unifying theoretical framework is needed to explain the inconsistencies in the literature.

The psychological flexibility model is an emerging conceptual model for understanding the development and maintenance of chronic pain, and is the theoretical basis of the Acceptance and Commitment Therapy (ACT). Psychological flexibility is defined as the ability to fully connect to the present moment and to engage in actions (either changing or persisting behavior) in line with one's identified goals or values based on a given situation or context (Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Hayes, Villatte, Levin, & Hildebrandt, 2011). The model posits that while behaviors are often subject to cognitive or language-based influences leading to psychopathology, the processes of psychological flexibility can counteract these influences through positive psychological skills/processes. One specific positive psychological process is committed action, which is referred to the development of effective actions that are linked to chosen values. Higher flexibility in the pursuit of goals and values as circumstances change is expected to include effective committed action. However, actions that cannot persist or persist in the face of repeated failure not only reflect a pattern of failure but are likely to lead to frustration and distress. Research on psychological flexibility and ACT in chronic pain setting is growing (Dahl, Wilson, & Nilsson, 2004; McCracken, MacKichan, & Eccleston, 2007; McCracken, Vowles, & Eccleston, 2005; Vowles & McCracken, 2008; Wicksell, Melin, & Olsson, 2007), but, as yet, not in Chinese cultural settings. One major barrier hampering our understanding of the applicability of the psychological flexibility model among Chinese is the lack of reliable and valid measures to assess the construct of psychological flexibility.

The Committed Action Questionnaire (CAQ) is a measure designed for assessing goal- and value-guided action (McCracken, 2013). The original CAQ consists of 18 items and a shortened, 8-item version (CAQ-8) has recently become available (McCracken, Chilcot, &

Norton, 2015). Both the CAQ and CAQ-8 possessed high internal consistency, with Cronbach's  $\alpha$  at .91 and .87 respectively, and demonstrate significant bivariate relationships with criterion such as pain intensity, depression, pain acceptance and functioning in expected directions (McCracken, 2013; McCracken et al., 2015). The CAQ also explained significant variance in/with depression, social functioning, vitality and general health in regression analyses (McCracken, 2013). The aim of this study was to examine the reliability, factorial and criterion validity of the Chinese version of CAQ-8 (ChCAQ-8) in a sample of Chinese patients with chronic pain. Here criterion validity was examined in relation to measures of depression and disability, key outcomes in chronic pain (Edwards, Smith, Kudel, & Haythornthwaite, 2006; Peters et al., 2005; Spinhoven et al., 2004; Sullivan et al., 2005). As an extension from previous studies we also included in our analyses a measure of pain catastrophizing. Pain-related catastrophizing, which is referred to as "an exaggerated negative mental set brought to bear during actual or anticipated pain experience" (Sullivan et al., 2001), has been identified as one of the strongest predictors of behavioral coping responses and adjustment outcomes among patients with chronic pain (Peters, Vlaeyen, & Weber, 2005; Sullivan, Lynch, & Clark, 2005; Turner, Mancl, & Aaron, 2004). Here we predicted that catastrophizing would significantly correlate with committed action and that committed action would correlate with patient functioning independent of catastrophizing. Such multivariate analyses are important to show the unique contribution of relatively new psychological variables.

## **Method**

### **Subjects**

A total of 210 consecutive patients with chronic pain attending pain clinic services at two public hospitals in Hong Kong participated in this study. Over 70% of the sample were women and over 65% aged 40 years of age or above. About half of the subjects reported a

monthly household income below HK\$24,999 (~ US\$3,200) and 55% were married or cohabiting. Over 61% had attained secondary education and most of them did not endorse any religion (58.1%). While about 36% of the sample had full time employment, 22% were unemployed or identified themselves as homemakers.

This sample had an average of 4.11 ( $SD = 3.34$ ; range, 1-16) pain sites, with 85% reporting multiple pain sites. The most common pain site was low back (81%), followed by leg (56%) and shoulder (30%). Patients reported an average duration for their pain problem of 7.29 years ( $SD = 7.19$ , median = 5 years, range, 3 months to 40 years). About 24% had had pain for up to 2 year's duration whereas 19% had suffered from chronic pain for over 10 years. The mean scores of present, average, and worst pain were 5.79 ( $SD = 2.29$ ), 6.25 ( $SD = 1.89$ ), and 8.45 ( $SD = 1.63$ ), respectively. On pain interference measures, the sample reported a mean score of 6.30 ( $SD = 2.35$ ), 6.23 ( $SD = 2.69$ ), and 6.56 ( $SD = 2.51$ ) for daily activities, social activities, and working ability interference, respectively. The sample reported an average of 10.61 days ( $SD = 23.52$ ; range, 0-90 days) of pain-associated disability in the past 3 months. The CPG classification placed 55% of the sample as Grade III or above (high disability and moderately-to-severely limiting). The mean scores of the PCS, HADS-Dep, and ChCAQ-8 were 30.46 ( $SD = 13.92$ ), 8.31 ( $SD = 5.51$ ), and 27.69 ( $SD = 12.02$ ) respectively. The study was approved by the Institutional Review Board and all subjects provided written informed consent.

### Measures

*The CAQ-8.* The English version of CAQ-8 consists of 8 (4 positively and 4 negatively phrased) items respectively. Respondents rate on a 7-point Likert scale (0 = never true; 6 = always true) the extent to which each item describes their experience. The Chinese version of the 8-item CAQ (ChCAQ-8) was initially translated from the original by the bilingual first author (WSW),

whose mother tongue is Chinese, emphasizing language comprehensibility and appropriateness for the Chinese cultural context. Backward translation was then conducted by a native English-speaking bilingual psychology postgraduate student. A second native English speaker subsequently reviewed the English back-translation for content equivalence between the back translated and the original CAQ-8 versions. Discrepancies were discussed and resolved by consensus, and modifications made as needed, resulting in the penultimate version of the ChCAQ-8. This penultimate version of the ChCAQ-8 was piloted on 10 Chinese patients attending a multidisciplinary pain clinic in Hong Kong. All participating patients the instructions and times were easy to understand.

*Chronic Pain Severity and Disability.* Chronic pain severity and disability was assessed using the Chronic Pain Grade (CPG) questionnaire (Von Korff, Dworkin, & Le Resche, 1990), a seven-item instrument that measures three domains of pain severity: persistence (1 item on number of pain-associated disability day), intensity (3 items) and disability/interference (3 items). A Characteristic Pain Intensity Score (score range: 0 to 100) is derived by averaging the responses to the intensity items and multiplying this by 10. A Disability Score (score range: 0 to 100) is derived by multiplying the averaging of the three interference items by 10. The CPG classifies subjects into five hierarchical grades: Grade Zero (pain free), Grade I (low disability-low intensity), Grade II (low disability-high intensity), Grade III (high disability-moderately limiting) and Grade IV (high disability-severely limiting). The English version of the CPG possesses good psychometric properties (Smith et al., 1997) and is responsive to change in pain severity over time (Elliott, Smith, Smith, & Chambers, 2000). The underlying structure of the Chinese version of CPG demonstrated good psychometric properties, with Cronbach's alphas for the CPG Disability and Characteristic Intensity scales of .87 and .68 (Fielding & Wong, 2008).



*Depression.* Depressive symptoms were assessed using the depression subscale of the Hospital Anxiety and Depression Scale (HADS-Dep) (Zigmond & Snaith, 1983). The HADS-Dep assesses affective and behavioral symptoms of depression. Psychometrics demonstrated good test-retest reliabilities and internal consistencies for the HADS-Dep ( $r = .92$ ,  $\alpha = .90$ ) (Snaith & Zigmond, 1994). The Chinese version also reported good internal consistency ( $\alpha$ s ranging from .77 - .86) and reliability (split half  $r = .86$ ) (Leung, Ho, Kan, Hung, & Chen, 1993).

*Pain-related cognition.* Pain-related catastrophizing cognitions were evaluated by the 13-item Pain Catastrophizing Scale (PCS), with total score ranging from 0 to 52 (Sullivan, Bishop, & Pivik, 1995). Rating on a 5-point Likert scale (1 = not at all; 4 = all the time), respondents are asked to reflect on past painful experiences and to indicate the frequency with which they experienced each of the 13 thoughts or feelings when experiencing pain. The PCS possessed good internal consistency ( $\alpha = .87$ ), test-retest reliability ( $r = .75$ ), and construct validity (Sullivan et al., 1995). The Chinese PCS also demonstrated good psychometric properties in a Chinese population ( $\alpha = .93$ , item-total  $r$ s ranging from .58 - .78) (Yap et al., 2008).

## **Data Analysis**

Standard descriptive analyses (mean and standard deviation [ $SD$ ]) were carried out to examine sociodemographic and pain characteristics of the sample. Bivariate relationships between variables and internal consistency were assessed for the ChCAQ-8. Confirmatory factor analyses (CFA) were performed using EQS or Windows 6.3 structural equation modeling program (Bentler & Wu, 1993). Univariate skew and kurtosis as well as the Mardia coefficient for skewness and kurtosis were computed to examine univariate and multivariate normality assumptions in the data, with Mardia's normalized estimate  $> 5.00$  indicative of non-normality

in the sample (Mardia, 1970). Each of the ChCAQ-8 items was specified to load on its respective factor, positive versus negative. Specifically, items 1 to 4 were specified to load on a latent “positive” factor whereas items 5 to 8 were specified to load on a “negative” factor. Two competing models, a correlated two-factor model and a hierarchical two-factor model, were tested for their fit to the present data set. In the correlated two-factor model, we assumed two latent “first-order” factors would explain the ChCAQ-8 items. Each item was specified to load on a first-order factor (either Positive or Negative) based on previous studies McCracken et al. (McCracken, 2013; McCracken et al., 2015) and the two factors were allowed to correlate. The hierarchical two-factor model hypothesized a priori that responses to the ChCAQ-8 could be explained by two first-order factors (one positive, one negative) as well as one higher- or second-order factor (Committed Action). This second-order factor was hypothesized to cause each of the two first-order factors. Model fit was assessed using  $\chi^2$  statistics, comparative fit index (CFI) (Hu & Bentler, 1999), normed-fit index (NFI) (Bentler & Bonett, 1980), root mean square error of approximation (RMSEA) (Browne & Cudeck, 1993), and 90% confidence interval of RMSEA (CI). CFI and NFI value of  $\geq .95$ , and RMSEA value of  $\leq .05$  were indicative of good fit (Browne & Cudeck, 1993; Hu & Bentler, 1999).

A series of multiple regression models were fitted to examine the association between ChCAQ-8 and concurrent criterion variables including depression and pain-associated disability, which were indexed by the HADS-Dep and the Disability Score of the CPG respectively. For each criterion variable, two models were fitted: the first model included pain intensity, pain duration, and ChCAQ-8, and the second model included pain intensity, pain duration, PCS, and ChCAQ-8. No sociodemographic variables were entered into the models as none of them demonstrated significant univariate association with the criterion variables ( $p > .05$ ). An independent multiple regression model was fitted to evaluate the association of ChCAQ-8 with sociodemographic (including age, gender, monthly family income, marital

status, education level, and employment status) and pain (including pain duration, pain intensity, level of disability, and number of pain sites) factors.

## **Results**

### ***Factorial validity of the ChCAQ-8***

The univariate skew estimates for the ChCAQ-8 items ranged between -.40 and .42. The univariate kurtosis estimates ranged from -.99 to -.45. Mardia's normalized estimate of multivariate kurtosis was 12.08. These estimates suggested the data was not normally distributed; hence, the Satorra-Bentler  $\chi^2$  statistics are reported (Satorra & Bentler, 1994). Table 1 reports the results of CFAs applied on the present sample for the ChCAQ-8. Both models fitted the data well with all fit indices meeting the minimum acceptable fit criterion. Moreover, the correlated model (S-B  $\chi^2 = 20.65$ ,  $df = 19$ , CFI = .99) yielded a slightly better data-model fit than the hierarchical model (S-B  $\chi^2 = 21.39$ ,  $df = 17$ , CFI = .98). In light of this, all subsequent analyses with the ChCAQ-8 utilized the positive and negative subscores. Standardized factor loadings of all items on their respective factors were statistically significant ( $p < .05$ ) (Figure 1). Higher standardized beta coefficients, ranging between .71 and .89, were obtained for the four positive items to the latent positive factor. Standardized beta coefficients for the four negative items on the latent construct ranged from .55 to .69. As expected, the correlation between the two latent factors was negatively valenced.

### ***Internal consistency and correlations of ChCAQ-8 with concurrent measures***

The ChCAQ-8 internal consistency was moderately high (total score:  $\alpha = .75$ ; positive subscale:  $\alpha = .86$ ; negative subscale:  $\alpha = .70$ ). Table 2 shows the ChCQA-8 negative subscale was significantly (all  $p < .01$ ) correlated with all other concurrent measures with  $r$ s ranging between .18 and .48. The correlation between the ChCAQ-8 positive subscale and the other

concurrent measures was weak ( $r_s \leq .22$ ), and its correlation with pain intensity and pain disability was not statistically significant ( $p > .05$ ). The mean score for the ChCAQ-8 positive and negative subscale was 18.03 ( $SD = 5.67$ ) and 13.98 ( $SD = 5.23$ ) respectively.

### **Multivariate prediction of concurrent depression and disability from ChCAQ-8**

Table 3 reports the results of multiple regression analyses. Both positive (Model 1:  $\text{std } \beta = -.14, p < 0.05$ ) and negative (Model 1:  $\text{std } \beta = .30, p < .001$ ) dimension of committed action as indexed by ChCAQ-8 contributed significantly along with pain intensity and pain duration for prediction of concurrent depression. After adding pain catastrophizing, only the negative dimension of committed action remained a significant independent predictor of depression (Model 2:  $\text{std } \beta = .19, p < .01$ ).

When concurrent disability was examined as a criterion variable, the positive dimension of committed action failed to reach statistical significance in both models with disability (Model 3:  $\text{std } \beta = -.01, \text{ns}$ ) and without disability (Model 4:  $\text{std } \beta = .01, \text{ns}$ ). The positive dimension of committed action however contributed significantly in both models of disability (Model 3:  $\text{std } \beta = .20, p < .01$ ; Model 4:  $\text{std } \beta = -.14, p < .05$ ) after adjusting for pain catastrophizing. All multivariate models tested were significant at  $p < .001$ .

Results of multiple regression models assessing the association of committed action with sociodemographic and pain factors showed that of the ten independent variables entered into the model, only education level emerged as a significant factor associated with ChCAQ-8 positive subscale ( $\text{std } \beta = .18, p < .05$ ). In a separate model, only disability ( $\text{std } \beta = .28, p < .01$ ) and number of pain sites ( $\text{std } \beta = -.15, p < .05$ ) were significantly associated with the ChCAQ-9 negative subscale.

### **Discussion**

This study examined the reliability, factor structure, and concurrent criterion validity of the ChCAQ-8 in a sample of Chinese patients with chronic pain. Our findings offer preliminary evidence for the reliability and validity of the instrument, given the satisfactory internal consistency, replication of a two-factor structure, and multivariate associations with the validity criteria.

The results of CFAs showed that both the two-factor correlated and the hierarchical models met the minimum acceptable fit criteria ( $CFI \geq .95$ ), with the correlated model obtaining a slightly higher CFI ( $= .99$ ). These CFA results align with previous reports that identified a two-factor structure for the CAQ (McCracken et al, 2013) and CAQ-8 (McCracken et al., 2015) using exploratory factor analysis (EFA) among English-speaking pain clinic attendees in the UK. This suggests the two-factor structure is equally legitimate in the current Chinese sample, lending tentative support for the ChCAQ-8's cross-cultural validity. The dimensions of committed action as measured by CAQ-8 appear robust for both Western and Chinese chronic pain patients. Both models demonstrated good data-model fit suggesting equally plausible explanations for the committed action construct, though the correlated model yielded a slightly higher CFI ( $= .99$ ) than the hierarchical model ( $= .98$ ). These findings of the scale appearing both unidimensional and also bi-dimensional point to possible methodological effects arising from the positive and negative wording of items. The inclusion of positively and negatively worded items on psychological measurements is a common strategy to reduce various forms of response bias, such as acquiescent bias and extreme response (Urban, Szigeti, Kokonyei, & Demetrovics, 2014). This strategy however confounds factor structure by having negative (or positive) items loading on one or more separate factors (Barnette, 2000; Pilotte & Gable, 1990), thereby introducing new bias. A higher CFI obtained in the correlated model in the current data may therefore be attributable to such method effects, instead of the construct of committed action. Our data indicating high CFI in both correlated and hierarchical model suggests that committed action as indexed by ChCAQ-8 (and its original English version) may be best

characterized parsimoniously as having one global, unidimensional factor along with method effects associated with positive/negative wordings of items. More research is needed to clarify the dimensionality of the CAQ and its adapted versions, including ChCAQ-8. A few measures have been suggested in previous studies to resolve the method effects issue, such as using negative (or positive) items only to derive a sum score, or using mixed response options rather than mixed items (Forsterlee & Ho, 1999; Wouters, Booyen, Ponnet, & Van Loon, 2012). Future studies may examine whether these measures could be applied in CAQ. Meanwhile, researchers and practitioners should be aware of the effects of positively and negatively worded items when using this scale.

Considering concurrent criterion validity, the negative score of ChCAQ-8 consistently emerged as significant independent predictor of concurrent depression and disability (std  $\beta$ s ranging from .14 - .30) after controlling for pain intensity, pain duration, and pain catastrophizing. The positive score of ChCAQ-8 was significantly associated with concurrent depression and disability after adjustment of the pain factors (Model 1 and 3). However, when pain catastrophizing was entered in the regression equations, the statistical significance of positive ChCAQ-8 disappeared (Model 2 and 4). These findings are not anomalous because pain catastrophizing has long been recognized as a strong predictor of pain-associated adjustment outcomes (Leeuw et al., 2007; Vlaeyen et al., 2004). In a previous report by McCracken et al (McCracken, 2013), CAQ demonstrated the highest predictive power for depression (std  $\beta = -.48, p < .001$ ) and mental health (std  $\beta = 0.51, p < .001$ ) outcomes but also failed to make significant contribution to the prediction of physical functioning (std  $\beta = .15, ns$ ). Our data however shows negative ChCAQ-8 predicted both depression and functional adjustment. These discrepant findings may be explained by the use of total scores in McCracken's (2013) study instead of positive and negative subscale scores in the current study.

The current findings evidenced the internal consistency of the ChCAQ-8 with moderately high Cronbach's  $\alpha$ s. It is interesting to note that our data are consistent with McCracken et al

(McCracken, 2013) in that the negative subscale obtained a slightly lower Cronbach's  $\alpha$  than the positive and the total score. Except for the correlation of positive ChCAQ-8 with pain intensity and pain disability ( $p > .05$ ), the univariate correlations between the ChCAQ-8 subscale scores and measures of pain intensity, disability, pain catastrophizing and depression all being significant (all  $p < .01$ ) in the expected direction and the strengths of the correlations being generally comparable with previous studies (McCracken, 2013; McCracken et al., 2015), lending preliminary support for the validity of the ChCAQ-8.

A few limitations of the current findings should be noted. First, as the ChCAQ-8 was assessed in a Chinese-Cantonese sample in Hong Kong, it is unclear the extent to which the current findings are generalizable to other Chinese populations speaking other Chinese dialects (e.g., Mandarin). Second, while our CFAs findings replicated the two-factor structure of the CAQ-8 reported in a study based on Western sample (McCracken, 2013), future research should determine the cross-cultural factorial invariance of the CAQ-8. Third, the cross-sectional design of this study does not allow the examination of the stability of the factor structure and the casual relationships between ChCAQ-8 and pain adjustment outcomes. Future studies using prospective, longitudinal designs would help filling these gaps.

Despite these shortcomings, our findings offer preliminary evidence for the reliability, factorial validity and concurrent criterion validity of the ChCAQ-8. These results support the adaptation of the ChCAQ-8 not only in Chinese contexts, but also many Western countries where Cantonese-speaking Chinese populations are high. More importantly, the availability of a reliable and valid measure of committed action would contribute to the cross-cultural research in the growing literature of the psychological flexibility model, especially in the chronic pain setting.

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**Table 1: Results of CFAs testing factorial validity of ChCAQ-8**

<b>Model</b>	<b>S-B<math>\chi^2</math></b>	<b><i>df</i></b>	<b>CFI</b>	<b>NFI</b>	<b>RMSEA</b>	<b>90% CI</b>
Correlated Model	20.65	19	.99	.99	.02	.00, .07
Hierarchical Model	21.39	17	.98	.98	.04	.00, .08

Note: ChCAQ-8: The Chinese version of the 8-item Committed Action Questionnaire; S-B $\chi^2$ : Satorra and Bentler scaled chi-square statistics; *df*: Degree of freedom; CFI: Comparative fit index; NFI: Normed fit index; RMSEA: Root mean square error of approximation; CI: Confidence interval.

**Table 2: Correlation between the ChCAQ-8 subscale scores and measures of pain intensity, disability, pain catastrophizing, and depression**

<b>ChCAQ-8</b>	<b>Pain intensity</b>	<b>Pain disability</b>	<b>Pain catastrophizing</b>	<b>Depression</b>
<b>Positive subscale</b>	-.06	-.07	-.24**	-.22**
<b>Negative subscale</b>	.18**	.32**	.48**	.38**

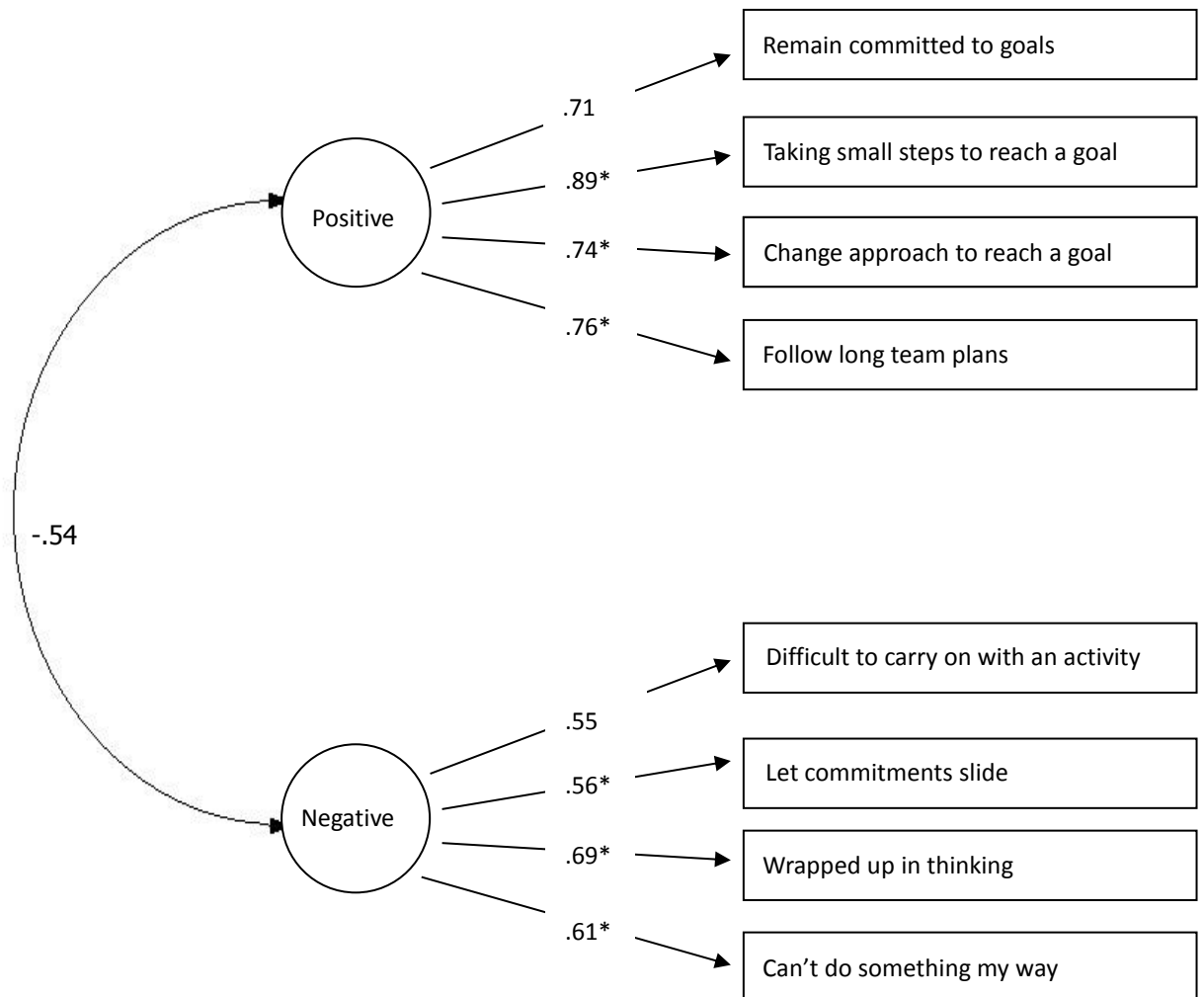
\* $p < 0.05$ ; \*\* $p < 0.01$ .

**Table 3: Multiple regression analyses predicting concurrent depression and pain disability with the ChCAQ-8 subscale scores**

Model	Block	Std $\beta$	Adj $R^2$	$F$
<b><u>Depression</u></b>				
1	1. Pain intensity	.24***	.227	16.032***
	2. Pain duration	-.15*		
	3. Committed action-Positive	-.14*		
	4. Committed action-Negative	.30***		
2	1. Pain intensity	.17**	.277	16.702***
	2. Pain duration	-.09		
	3. Pain catastrophizing	.29***		
	4. Committed action-Positive	-.10		
	5. Committed action-Negative	.19**		
<b><u>Disability</u></b>				
3	1. Pain intensity	.49***	.326	25.778***
	2. Pain duration	-.18**		
	3. Committed action-Positive	-.01		
	4. Committed action-Negative	.20**		
4	1. Pain intensity	.45***	.339	21.919***
	2. Pain duration	-.14*		
	3. Pain catastrophizing	.16*		
	4. Committed action-Positive	.01		
	5. Committed action-Negative	.14*		

Note: Depression was indexed by the Center for Epidemiological Studies – Depression scale; Disability was indexed by the CPG Disability score with scores ranging from 0 - 100 and higher scores indicating greater level of disability; Pain intensity was indexed by the CPG Characteristic Pain Intensity score, with scores ranging from 0 -100 and higher scores indicating higher pain intensity; Pain catastrophizing was indexed by the Pain Catastrophizing Scale; ChCAQ-8 was indexed by the Chinese version of the 8-item Committed Action Questionnaire; Std  $\beta$ : Standardized beta coefficient; Adj  $R^2$ : Adjusted  $R^2$ ;  $F$ :  $F$  statistics.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .



**Figure 1: Standardized path coefficients for the correlated model of the ChCAQ-8.**